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USSR WORK ON TRANSMISSION OF VETERINARY INFECTIOUS DISEASES BY RATS

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In the fight with infectious diseases of animals, veterinary specialists use vaccines and sera. They apply diagnostic agents, isolate diseased animals, organize quarantine measures, and, by disinfecting the premises, exterminate the causative factor of the disease at the focus of the infection.

These means and methods of controlling infectious diseases of animals proved to be highly effective in practical use and made it possible to prevent the appearance of and eliminate many infectious diseases in animals.

In addition to the measures outlined above, it is also necessary to exterminate rats on an extensive scale.

Academician Ye. N. Pavlovskiy in his teaching on transmissive diseases indicated that rodents play an important role in preserving the causative factors of a number of diseases in nature. Pavlovskiy has also clarified the mechanism of the transmission of these diseases by blood-sucking insects.

An outstanding example of the role played by rats in the transmission of veterinary diseases is their function in the transmission in the causative factor of Aujeszky's disease. At hog-breeding farms, the outbreaks of Aujeszky's disease among swine coincide with the period of the maximum multiplication of rats and mice at the pigsties. At infected farms, the rats and mice develop clinical symptoms which remind one of Aujeszky's disease. Using an emulsion of the brain of diseased rats, one may infect rabbits. The rabbits develop a disease which has the typical characteristics of Aujeszky's disease.

By feeding to pigs the corpses of rats and mice which had died or were killed after developing the symptoms of Aujeszky's disease, the alimentary transmission of this disease was confirmed.

Cases have been observed where cats acquired the disease after feeding on rodents at pigsties where Aujeszky's disease had occurred.

After the hogs have been removed from an infected pigsty, the rodents exterminated there, and disinfection carried out, one may bring in healthy animals without any danger of infection.

Thus, we can see that the control of Aujeszky's disease is closely connected with the extermination of rodents at infected farms.

The fact that rats carry brucellae and are subject to infection with brucellosis has also been proven. Convincing proof has been obtained by I. A. Karkadinovskaya, who found that out of 34 rats captured on premises where animals infected with brucellosis were kept, brucellae could be isolated from 11 rats.

In another case, Karkadinovskaya succeeded in isolating from seven out of 18 rats at an infected sovkhoz brucellae from the spleen, liver, lymphatic nodes, and blood.

By infecting animals and, in turn, catching the infection from them, rats function as a reservoir of brucellosis at farms. The reservoir is maintained

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not only by the presence of diseased farm animals, but it is also fostered by the cannibalism which is common among rats. When healthy rats are kept together with brucellar rats, they eat them and become infected with brucellosis.

Cases have been observed in which healthy animals were brought to a farmyard that had been disinfected after the removal of brucellar animals; the healthy animals also caught brucellosis. The source of the infection in this case was formed by the remaining brucellar rats which infected with their excrements the feed, feed cribs, and premises.

The fact that rodents which infest animal husbandry farms carry bacilli was also confirmed by A. A. Zotova. She established the presence of rats suffering from brucellosis at an insulator where animals infected with this disease were kept.

At a farm where a diplococcus infection was prevalent, three out of 12 rats that had been investigated and four out of 15 mice that had been tested yielded septic diplococci, which brought about the death of experimental animals after the cultures were injected into them subcutaneously.

At another farm where intestinal diseases of young animals occurred, Zotova isolated from six out of 32 rats and from two out of six mice a virulent strain of B. coli. She also isolated from the rats suipestifer bacilli, as well as Proteus vulgaris. A considerable proportion of rats are infected with tuberculosis: at zoological gardens and at fowl-breeding farms. up to 12% of rats are infected with fowl tuberculosis. The rats are infected with tuberculosis to no small extent at animal husbandry farms where tuberculosis occurs among the animals. Zotova succeeded in producing infection of rats with tuberculosis by feeding to them infected material at the laboratory. The possibility that the infection may be spread by the excrements of sick rats has also been demonstrated.

The infection of animals with botulism from corpses of rodents has been mentioned in the literature. Academician S. N. Vyshelesskiy states that the causative factor of botulism may propagate in the corpses of rats with the formation of the botulinus toxin which poisons animals. Some authors assert that botulism occurs only in those cases where corpses of rats that have been infected with botulism are present in the feed. K. I. Matveyev isolated botulinus bacilli from 12 gray rats out of 50 which had been investigated. In nine cases, according to this author, the strains isolated belonged to the toxic type A.

Rodents also function as transmitters of leptospirae. Gray rats, black rats, and Alexandria rats are subject to infection with leptospirae. Investigation showed that 10-40% of gray rats are chronic carriers of leptospirae. Academician Vyshelesskiy states that rodents suffering from leptospirosis may become a source of infection by contaminating the feed of animals with their excrements.

Data have been published to the effect that rats are susceptible to the foot-and-mouth disease. This susceptibility indicates that rodents may play an epizootological role in the transmission of the foot-and-mouth disease. Rats are both mechanical transmitters of the virus of foot-and-mouth disease and virus carriers of this disease. In view of the high infectiousness of the rodent with infected material, for instance with excrements, saliva, or feed, is sufficient to transport the virus to another stall or even another farm.

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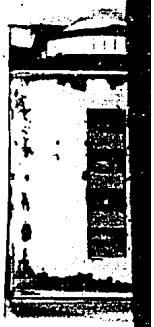

The role of rats in the transmission of tularemia is especially important. In the descending order of susceptibility, the following animals become infected with tularemia: sheep, goats, cattle, bisons, camels, horses, donkeys, and chickens. The susceptibility to tularemia of a great number of animal species contributes to the widespread occurrence of this disease among rodents. The rodents that are most susceptible to tularemia belong to the mouse family. The following members of the mouse subfamily are susceptible to tularemia: house mice, forest mice, field mice, harvest mice [Micromys minutus], and gray rats. In the subfamily of voles, the following species are susceptible to tularemia: the aquatic vole or aquatic rat [Arvicola terrestris], Ondatra zibethica, the Norwegian lemming, the steppe lemming [Lagurus lagurus], the gray vole, the rat-headed vole, and others. The fact that gray rats become infected with tularemia was originally demonstrated in Los Angeles in 1925. Pashkevich confirmed this finding in the USSR in 1938.

Rodents infected with tularemia spread the causative factor of this disease in the environment and create a danger of the infection among other animals. The danger of infection is particularly great in the case of farm animals because of the direct contact of these animals with rodents which inhabit stacks and ricks, the barns in which the farm animals are kept, and farmyards. The infection may also take place because of the great number of larvae and nymphs of ticks and mites which live as parasites on the rodents.

To illustrate the profuse occurrence of rodents and objects found within animal breeding farms and other animal husbandry farms, one may cite the observations of Kalabukhov and of Obolenskiy (1933), who found 4,000 mice in a single stack of chaff.

Wild animals are infected with tularemia by transmission of the infection from diseased voles through the medium of Ixodidae ticks. The close contact of rodents with each other in burrows, the ectoparasites which live on rodents, and cannibalism among rodents assure reinfection on a large scale. Epizootics of tularemia among rodents were observed repeatedly in various localities. In the transmission of the infection by diseased rodents to other animals, Ixodidae ticks are of great significance. These ticks parasitize in the form of larvae and nymphs on rodents, while adult ticks infest other animals, particularly sheep, which are most susceptible to infection with tularemia.

It has been established that the causative factor of tularemia, on being transmitted by an adult female tick transovarially to the larva and subsequently to the nymph is preserved up to 247 days. The prolonged preservation of the causative factor in corpses has also been established. This explains the origin of spring epizootics of tularemia among rodents which are infected from the corpses of rodents that died in the fall or early winter. The corpses of rodents that have died of tularemia are also a frequent cause of the infection of pigs, which devour these corpses. N. Ya. Popov states that tularemia occurs among horses in the fall. The outbreaks of tularemia among horses are explained by the appearance of a considerable number of rodents of the mouse family in the fall and by the presence of rodents infected with tularemia among them.

Infection with trichinellae occurs among rats, house mice, yellow-throated mice [Apodemus flavicollis], common shrews [Sorex araneus], and moles. Pigs, after eating the corpses of infected rodents, catch trichinosis. Billins [Billings?] stated that 100% of the rats in the slaughterhouse of Boston are infected with trichinosis, 76% at the knacker's yard in the same city, and 10% in the city itself.

The role played by rodents in the transmission of rickettsioses has been proven. It has been established that rickettsiae of the murine type produce infection in guinea pigs after penetrating through the injured skin or through the mucous membranes of the eyes, nose, and mouth. The infected guinea pigs eliminate rickettsiae of the murine type with their urine.

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Thus, one may conclude that rodents (rats and mice) which inhabit premises used for animals form a reservoir of many infectious diseases of animals. The transmission of infectious diseases from the rodents to the farm animals proceeds through the medium of infected excrements of sick rodents, infected feed or water, and whenever the animals devour diseased rodents or their eliminations. Finally, transmission of the disease may proceed through fleas, ticks, mice, mosquitos, flies, and other arthropods which infest rodents. All this indicates that the extermination of rodents at farms is obligatory as a part of measures taken against veterinary infectious diseases; in addition to that, the extermination of rats must be carried out in the interior of animal husbandry buildings, as well as in orchards and fields.

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